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ABSTRACT

As an initial review of National Assessment of Educational Progress data designed to determine whether the achievement of American youth is improving, a limited examination of changes in levels of achievement during the 1970s is presented. Benchmark assessments established in 1974-75 indicates a large degree of consistency from one learning area to another in terms of the various regional and racial subgroups of students. Findings on levels of achievement over the 9-year period were examined. Overall the achievement pattern for 9-year-olds was found to be quite encouraging; clearly less encouraging for 13-year-olds; and disheartening for 17-year-olds. Differential changes in each learning area and the relative improvement of low-achieving subgroups are discussed. Possible school and societal factors influencing achievement are examined. (CM)

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EDUCATIONAL ACHIEVEMENT TRENDS: A MIX OF GAINS AND LOSSES

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Trying to measure and report what young Americans know and can do is indeed an awesome task. The National Assessment of Educational Progress (NAEP) has been striving to achieve this goal starting in the mid-1960s. In the past thirteen years, twenty-five assessments of achievement in ten learning areas have been conducted, samples totalling over one million individuals have been tested, and literally tens of millions of pieces of data have been gathered, analyzed, and reported. Because of this we know a good deal more about the achievement levels of school-age children in common learning areas such as the basic skills, science, and social studies. On the other hand innumerable questions remain, and the task given the National Assessment is far from completed (Ahmann, 1976).

In Table 1 is a list of the ten learning areas for which assessments were developed. Three are basic skill areas, four can be considered general subject-matter areas, and three can be classified as part of the humanities and fine arts. In the past thirteen years six of the learning areas have been assessed three times, three have been assessed twice, and one has been assessed once. In addition, four "special probes" have been conducted in consumer skills, energy, health, and basic reading.

The primary purpose of the assessments is to describe trends in educational achievement in America today. Each assessment is a product of many years of work by a large number of people. First of all, concensus objectives are designed for each learning area which are to represent that part of the area with which schools should be concerned. Objective-referenced

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exercises suitable for 9-, 13-, and 17-year olds (and sometimes young adults) are developed in terms of each objective and, if successfully designed, should provide information as to the degree to which that objective is being achieved by young Americans. Most exercises have a cognitive emphasis and some require performance, for example writing an essay, drawing a picture, or manipulating apparatus.

Of crucial importance to National Assessment is the measurement of any changes in level of achievement with the passage of time. To accomplish this goal about one-half of the exercises from the first assessment are reused in the second, and many of those are used in the third assessment as well. As shown in Table 1, assessments are repeated as soon as three years and usually not later than nine years. Typically a learning area is assessed every four or five years.

BENCHMARK ASSESSMENTS

All learning areas have been assessed at least once by 1974-75, thereby establishing achievement benchmarks. When each is considered as a composite, one finds a large degree of consistency from one learning area to another in terms of the relative performance of the various subgroups of the student populations sampled (Ahmann, 1979a). As a case in point, regional differences are reasonably consistent in that students in the Northeast typically achieve at a higher level than those of the other three regions, those in the Central region are usually somewhat above the national average, and those in the Southeast usually fall below the national average.

Similarly, students living in economically advantaged-urban areas ("affluent suburbs") are, as expected, usually above the national average in their achievement; those living in the economically disadvantaged - urban

areas ("inner city") usually fall well below the national average as do students living in "extreme-rural" areas.

Moreover, there are usually sharp differences in achievement among students tested when they are classified in terms of the educational level of their parents. As the level of parental education rises the performance level of the students increases remarkably and with striking consistency in all learning areas, especially in the basic skills.

Finally, levels of achievement differ among students from the major ethinic groups. Achievement levels for black and Hispanic students typically fall below the national average while those for white students usually fall above the national average.

The relative position of various subgroups in terms of achievement in the ten learning areas is not altogether surprising. On the other hand, the sizes of some of the differences between the subgroups and the national average are unusually large. These must be interpreted to mean that some schools face very different teaching-learning situations than do others if the mix of students varies widely.

DETERMINING NATIONAL TRENDS IN ACHIEVEMENT

Repeatedly the question is raised as to whether levels of achievement of young Americans are declining today. This question is particularly difficult to answer on the national level unless one turns to the data provided by the National Assessment. Massive as this data bank is, it still provides only part of the answer, but that part is important to the educational enterprise and therefore needs to be studied with care. The best approach would be to examine the responses made by students over several assessments with respect to each exercise associated with a significant objective. Such a

study could address the wrong answers provided as well as the correct answer designated.

In contrast to the exercise-by-exercise approach mentioned, one can conduct a useful but more limited review of NAEP data using average changes in levels of achievement in each learning area when subdivided into major categories, followed by an examination of any shift in the relative position of subgroups of the students tested. In other words, one can examine science achievement in terms of exercises devoted to biological sciences separate from those devoted to physical science. This division improves the degree of interpretability of the data but still falls far short of an exercise-by-exercise analysis.

The benchmark assessments showed that the relative position of the various subgroups of the students tested remained reasonably constant with respect to levels of achievement above and below the national average for a given learning area considered as a composite. Since students in some of the subgroups are commonly thought of as economically "disadvantaged," it would be extremely interesting to study any shifts in the relative position of these students with respect to achievement in a given learning area with the passage of time, for instance, during the 1970s. The following review is a limited examination of the changes in levels of achievement found in eight learning areas in that decade. It represents the beginning point of any exhausted review of National Assessment data designed to determine whether the achievement of American youth is improving or not.

LEVELS OF ACHIEVEMENT IN READING

General Reading

National Assessment has measured levels of achievement in general read-

ing three times in the 1970s, namely, 1970-71, 1974-75, and 1979-80. Common reading exercises were administered in all three assessments in order that changes in levels of general reading performance could be measured for the nine-year period.

The exercises used were classified into three categories, namely, literal comprehension, inferential comprehension, and reference skills. Literal comprehension exercises required the students to remember the exact meaning of the material read, whereas inferential comprehension exercises required the students to infer from a reading passage ideas that are not explicitly stated. Reference skills exercises required the students to demonstrate where and how to find information.

In Table 2 are summarized the average changes in levels of general reading achievement over the nine-year period of the three assessments (NAEP, 1981c). Changes for the first four years, the following five years, as well as the total nine-year period are shown.

The pattern of changes is quite remarkable. Nationally, the overall reading performance level for 9-year-olds rose 3.9%, whereas the reading performance for 13- and 17-year-olds did not change appreciably in the 1970s. It should be noted however that the performance of 13-year-olds in literal comprehension improved slightly (1.6%) whereas the 17-year-olds declined slightly (2.1%) in inferential comprehension.

Several subgroups of students made significant gains in nine years with regard to certain categories of general reading exercises. For example, 9- and 13-year-olds from the Southeast made significant gains in literal comprehension, and 9-year-olds in the Southeast also gained in inferential comprehension and reference skills. Moreover, 9- and 13-year olds who are

black made unusual gains in literal and inferential comprehension as well as in reference skills. Finally 9-year-olds attending schools in rural communities made important gains in literal and inferential comprehension and in reference skills. The largest gain of all was made by 9-year-old black students whose overall reading performance improved 9.9% in nine years; 13-year-old black students gained 4.2%. In summary, students from low-achieving groups tended to improve their reading performance during the nine-year period and as a result narrowed the gap between themselves and the national averages.

Basic Reading

In addition to measuring general reading performance, National Assessment also measured basic reading performance of 17-year-olds. This occurred as a part of the general reading assessment in 1971-72 and was repeated in 1974 and 1975. These reading exercises dealt with comparatively simple tasks such as being able to read instructions and directions.

As in the case of assessments of general reading ability, changes were found in levels of performance in basic reading from 1971 to 1975. For example, a gain of almost 5% was made by black students whereas white students gained only about 2% during this period. Seventeen-year-olds in the Southeast gained over 3% while students from the Northeast showed no gain. A gain by students living in low-income urban areas of nearly 5% was found whereas 17-year-olds from the affluent urban areas showed no gain. Indeed, there are indications of decline in some aspects of general reading achievement for the latter group throughout the 1970s. To be sure, once again low-achieving subgroups of students improved their relative position in reading achievement although still below the national average (Gadway and

Wilson, 1976).

LEVELS OF ACHIEVEMENT IN MATHEMATICS

Levels of achievement in mathematics were measured on a national scale in 1972-73 and again in 1977-78. The mathematics assessment included exercises measuring mathematical knowledge, skills, understanding, and applications. The changes in levels of achievement are summarized in Table 3 (NAEP, 1979). Although the level of achievement in 9-year-olds could not change during the five years separating the two assessments, the levels of achievement for 13- and 17-year-olds declined, 2% in the former instance and 4% in the latter.

In general the computational skills of the students were high in both assessments. On the other hand, problem-solving ability dropped noticeably during the five-year period. In sharp contrast to this finding is the fact that the students' knowledge of metric terminology improved a great deal from 1972-73 to 1977-78. Certainly this is a reflection of the trend of the times.

As in the case of reading achievement, once again certain groups of low-achieving students improved their relative performance in five years. For instance, the levels of mathematics achievement of black 9- and 13-year-olds were significantly closer to the national levels at the second assessment than the first. Also, for 9- and 13-year-olds the difference between performance of those living in economically disadvantaged-urban areas and the nation became smaller during the five-year period. This trend along with a somewhat similar one in reading is indeed encouraging news.

LEVELS OF ACHIEVEMENT IN WRITING

In each of its three assessments of writing in the 1970s, National

Assessment required students to prepare writing samples. These were evaluated for overall quality, rhetorical effectiveness, coherence, cohesion, syntactic fluency, and mechanical correctness. This comprehensive evaluation showed that the three age groups performed somewhat differently over the decade; each age group seems to have its own pattern of strengths and weaknesses. On the other hand, some uniformities were found. For example, 13- and 17-year-olds either improved their expressive writing skills or the skills remained at about the same level during the 1970s, while persuasive and descriptive skills appeared to be declining. Also, an analysis of writing errors do not reveal any major changes over the nine years of the assessments for any age group (NAEP, 1980).

The holistic evaluation of writing samples did not reveal a major decline or improvement in writing performance of 17-year-olds. However, it did suggest that there was a decline in the quality of descriptive essays written by 13-year-olds. Most of that decline took place between 1969 and 1973 with little change occurring during the late 1970s. Finally, holistic scoring did not reveal significant changes in the average writing performance of 9-year-olds in the 1970s.

Once again improvement was noted with regard to certain subgroups of students. For instance black 13- and 17-year-olds improved either absolutely or relatively on all writing tasks which were required. Furthermore, 17-year-olds from economically disadvantaged-urban areas made steady gains over the nine-year period. Nine- and 13-year-olds in this subgroup did not fare as well. Few improvements in achievement of consequence were found for the other subgroups which typically fall below the national average.

LEVELS OF ACHIEVEMENT IN SCIENCE

The three assessments in science took place in 1969-70, 1972-73, and

1976-77. The changes in achievement in biological and physical science measured by these three assessments are shown in Table 4 (NAEP, 1978c). This table reveals that a noticeable decline in achievement occurred at each of the three age groups from the first assessment to the second and, in the case of the 17-year-olds, from the second assessment to the third. The levels of achievement for 9- and 13-year-olds at the third assessment were similar to those of the second assessment.

Declines in levels of achievement in physical science were more pronounced than those in biological science especially for 17-year-olds. In the case of 9- and 13-year-olds, achievement in biological sciences changed very little if at all across the three assessments.

The relative achievement of most of the subgroups in the samples tested did not change appreciably over the seven-year period during which the assessments were conducted. However, students at the three age levels who live in extreme-rural communities did improve in science achievement from 1969-70 to 1976-77. Also, black 13-year olds improved in physical science achievement from the second to the third assessment.

Another way to study changes in levels of achievement in science is to examine the results when the analysis is restricted to the same set of exercises administered to a given age group three times over seven years. When data from these exercises are used as a basis for determining changes in levels of science achievement, one finds pronounced declines for all three age groups. In the case of 9-year-olds the decline over the seven-year period was 1.9%, for 13-year-olds 3.6%, and for 17-year-olds 4.7%. The trend displayed is disheartening, but it must be remembered that the scope of the assessment in this instance is comparatively narrow, and therefore

the data must be interpreted somewhat cautiously.

LEVELS OF ACHIEVEMENT IN SOCIAL STUDIES AND CITIZENSHIP

In Table 5 are shown the changes in levels of achievement in social studies which were recorded by the National Assessment as a result of its assessments conducted in 1971-72 and 1975-76 (NAEP, 1978b). Exercises dealing with knowledge, skills, and attitudes were included in the assessments. In general no change was found for 9-year-olds, but 13-year-olds declined slightly while 17-year-olds declined significantly.

Some of the subgroups of students improved their relative position with regard to achievement in social studies. For example, 9-year-old black students showed improvement in four years while 9-year-old white students did not. Among the 17-year-olds, Hispanics and those living in the West declined less than the entire group. Also, 17-year-olds living in affluent-urban communities showed somewhat larger drops in achievement in social studies than did the nation as a whole.

Political knowledge and attitudes were measured in both social studies assessments as well as the citizenship assessments. Exercises from these two learning areas permitted National Assessment to report levels of achievement for 13- and 17-year-olds for such topics as constitutional rights, respect for others, structure and function of government, and the political process (NAEP, 1978a).

The foregoing analysis revealed striking declines in level of achievement for both 13- and 17-year-olds, especially the latter. A decline of over 10% was reported for 17-year-olds with respect to their achievement concerning the structure and function of government, and a decline of slightly over 5% occurred for 13-year-olds in this category. In the case of the po-

litical process category, the 17-year-olds experienced a decline of over 6% whereas the 13-year-olds had a decline of slightly over 4%. Declines in achievement were generally smaller on exercises concerned with constitutional rights and respect for others.

Thirteen- and 17-year-olds living in extreme-rural communities revealed a tendency to improve their achievement in citizenship relative to the nation as a whole. On the other hand, practically all of the other subgroups held their relative position during the period covered by the several assessments of social studies and citizenship.

LEVELS OF ACHIEVEMENT IN ART

Assessments of art achievement took place in 1974-75 and in 1978-79. These assessments were based on five major objectives in art, namely:

1. Perceive and respond to aspects of art.
2. Value art as an important realm of human experience.
3. Produce works of art.
4. Know about art.
5. Make and justify judgments about the aesthetic merit and quality of works of art.

All objectives were used in both assessments as a basis for developing the exercises. Some of the results of the two assessments are show in Table 6 (NAEP, 1981a).

Once again there are significant decline in achievement between assessment for 13- and 17-year olds. This decline was particularly pronounced in the case of achievement in regard to the second objective, namely, "valuing" art. In this area 13-year-olds declined 3.3% and 17-year-olds 4.0%. One interpretation of these declines is that teenagers are less willing to ac-

cept all kinds of art, not simply traditional form.

Contrary to the expectations of some, many subgroups of students held the same relative positions with regard to national average levels of art achievement, as they did for academic subjects such as reading, mathematics, and science. Evidentally socio-economic factors have a bearing on art achievement, and therefore students whose parents have some education beyond high school or live in economically advantaged-urban areas, usually are above the national levels of art achievement. Students from lower socio-economic levels tend to fall below the national average in this learning area.

LEVELS OF ACHIEVEMENT IN MUSIC

Exercises used in the first assessment of music achievement in 1971-72 were based on five objectives. However only three of these objectives were also used in the second assessment in 1978-79 and therefore changes in levels of music achievement are restricted to these three, namely:

1. Value music as an important realm of human experience.
2. Identify the elements and expressive controls of music.
3. Identify and classify music historically and culturally.

In Table 7 are shown the changes in levels of achievement in terms of these three music objectives (NAEP, 1981b).

Beyond question there was a tendency for music achievement for 9- and 17-year-olds to decline during the seven-year period. Insofar as the 13-year-olds are concerned, little or no change in music achievement occurred in the aggregate. On the other hand, there is evidence that the 13-year-olds value music as an important realm of human experience to a greater degree at the time of the second assessment in 1978-79 than the first assessment in 1971-72. For 9- and 17-year-olds, achievements slipped most with

respect to the objective dealing with identifying the elements and expressive controls of music.

Some of the subgroups which traditionally achieve below the national average contradicted that tendency with regard to their achievement measured by exercises associated with the first objective dealing with "valuing" music. Achieving above the national average in 1978-79 with respect to exercises associated with this objective are 9-, 13-, and 17-year-olds who live in the Southeast, 13-year-olds who are black or who live in extreme-rural areas, and 17-year-olds who are black. This reversal of position with respect to the national achievement level did not occur with regard to the other two objectives used in both assessments.

DIFFERENTIAL CHANGES IN ACHIEVEMENT

While no sweeping conclusions can be drawn from the National Assessment data reported, certainly it is reasonable to identify differential trends that are emerging. Sufficient data exist to justify limited generalizations which ultimately can be compared to the findings of future assessments.

One overall impression of note is that the achievement pattern for 9-year-olds is quite encouraging, with the possible exception of achievement in music. Achievement patterns are clearly less encouraging for 13-year-olds, and educators should be definitely disheartened by the achievement trends for 17-year-olds.

On the other hand, we can be hopeful about achievement in certain learning areas. Reading--crucial as it is in all academic achievement--presents one of the more positive pictures. Many gains occurred for younger students, and very few losses which were statistically significant for older students. Also, achievement in writing did not rise or fall in any appreciable way.

The declining achievement levels in mathematics, science, social studies, art and music are another matter. The declines in art and music are particularly troubling if one takes the point of view - as some did - that lower than expected achievement levels in verbal and mathematical areas were the outcome in part of a better balanced curriculum with more emphasis on the humanities and fine arts. If nothing else, the falling levels of achievement in art and music suggest that no segment of the curriculum is free of declining test scores.

No doubt one of the most exciting findings of National Assessment is the somewhat common relative improvement of a number of low-achieving subgroups such as economically disadvantaged students and black students. Even though these students continue to achieve below national averages, they have repeatedly improved noticeably in reading, and in some instances in mathematics and social studies. An outstanding example of this is the 9.9% improvement of black 9-year-olds in reading in nine years. Should gains such as these be continued in the future, the average achievement of low achieving subgroups would soon approach national averages.

What causes the differential patterns of achievement of the kind reported? Certainly surveys such as NAEP do not identify causal relationships. Yet its data invite speculation which in turn generate interesting hypotheses for future research.

Two families of factors which influence achievement are almost always identified: school factors and societal factors. The school factors include the amount of time in the classroom spent on teaching and learning, the proliferation of courses with less rigorous standards, disagreement with regard to the most appropriate methods of teaching to be used in the elementary and secondary schools, and increased student absenteeism. So-

cietal factors are more complex. Among them are a changing emphasis with respect to the work ethic and "middle class values," excessive time spent viewing television programs, and instability in the home which causes the parents to be less vigorous partners in the education of their children (Ahmann, 1979b).

It is reasonable to believe that societal factors most likely would have a broad rather than differential effect (either positive or negative) on student achievement in all or almost all learning areas, and in contrast, school factors most likely would be associated with differential changes in levels of achievement in learning areas for which schools have a heavy responsibility (for example, mathematics and science). Differential gains and losses in learning areas that are highly school-specific beg for an explanation. Are these changes caused by variations in the teaching/learning environment traced in part to such widely disparate influences as differences in curriculum and teaching materials and methods; teacher shortages in mathematics and science; the "back to the basics" movement; the number of elective courses in high school; or national initiatives such as the Title I program of disadvantaged children? These are but a few of the possibilities.

If all goes well, fourth and even fifth assessments will be conducted in future years in the basic skills and perhaps the general subject-matter areas as well. These data no doubt will provide an even more precise description of the differential achievement changes which have already started. Interesting as these data may be, they are only beginning points, not end points, in our quest for factors which influence student achievement.

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TABLE 1

COMPLETED ASSESSMENTS FOR
TEN LEARNING AREAS

Learning Area	Assessments		
	First	Second	Third
Basic Skill Areas			
Reading	1970-71	1974-75	1979-80
Writing	1969-70	1973-74	1978-79
Mathematics	1972-73	1977-78	1981-82
General Subject-Matter Areas			
Science	1969-70	1972-73	1976-77
Social Studies	1971-72	1975-76	1981-82*
Citizenship	1969-70	1975-76	1981-82*
Career and Occupational Development	1973-74		
Humanities and Fine Arts Areas			
Literature	1970-71	1979-80	
Art	1974-75	1978-79	
Music	1971-72	1978-79	

*Citizenship and Social Studies were combined into a single integrated learning area with one-half of the assessment completed in 1981-82 and the remainder scheduled for 1983-84.

TABLE 2

AVERAGE CHANGES IN LEVELS OF
READING ACHIEVEMENT

1970-71 to 1979-80

Area	9-year-olds	13-year-olds	17-year-olds
Literal Comprehension			
70-71 to 74-75	1.0%	0.7%	0.5%
74-75 to 79-80	2.8%*	0.9%	-0.7%
9-year change	3.9%*	1.6%*	-0.2%
Inferential Comprehension			
70-71 to 74-75	0.9%	-0.8%	-0.9%
74-75 to 79-80	2.5%*	0.2%	-1.2%
9-year change	3.5%*	-0.6%	-2.1%*
Reference Skills			
70-71 to 74-75	2.3%*	-1.7%	0.6%
74-75 to 79-80	2.6%*	2.6%*	0.2%
9-year change	4.8%*	0.9%	0.8%
Composite			
70-71 to 74-75	1.3%*	-0.1%	0.0%
74-75 to 79-80	2.6%*	0.9%	-0.8%
9-year change	3.9%*	0.8%	-0.7%

*Change is significant at the .05 level

TABLE 3

AVERAGE CHANGES IN LEVELS OF
MATHEMATICS ACHIEVEMENT

1972-73 to 1977-78

Area	9-year-olds	13-year-olds	17-year-olds
Knowledge	0%	0%	-1%
Skills	0%	-2%*	-5%*
Understanding	**	-2%	-4%*
Applications	-6%*	-3%*	-4%*
Composite	-1%	-2%*	-4%*

* Change is significant at the .05 level
** Insufficient data

TABLE 4

AVERAGE CHANGES IN LEVELS
SCIENCE ACHIEVEMENT

1969-70 to 1976-77

Area	9-year-olds	13-year-olds	17-year-olds
Biological			
69-70 to 72-73	-1.0%	-1.2%	-1.2%*
72-73 to 76-77	1.4%*	0.9%	-1.1%
Physical			
69-70 to 72-73	-1.5%*	-2.6%*	-3.5%*
72-73 to 76-77	-1.3%*	-0.8%	-2.4%*
Composite			
69-70 to 72-73	-1.2%*	-1.7%*	-2.8%*
72-73 to 76-77	-0.1%	-0.7%	-1.9%*

* Change is significant at the .05 level

TABLE 5

AVERAGE CHANGES IN LEVELS OF
SOCIAL STUDIES ACHIEVEMENT

1971-72 to 1975-76

Area	9-year-olds	13-year-olds	17-year-olds
Knowledge	1.6%	-1.1%	-3.9%*
Skills	1.3%	-2.0%*	-2.4%*
Attitudes	**	-1.9%*	-1.8%*
Composite	No change	Slight Decline	-3.0%*

* Change is significant at the .05 level
** No data

TABLE 6

AVERAGE CHANGES IN LEVELS OF
ART ACHIEVEMENT

1974-75 to 1978-79

Objective	9-year-olds	13-year-olds	17-year-olds
Perceive and respond to art	**	0.2%	0.3%
Value art	0.9%	-3.3%*	-4.0%*
Know about art	**	-2.7%*	-0.1%
Composite for five objectives	0.7%	-2.2%*	-1.9%*

* Change is significant at the .05 level
** Insufficient data

TABLE 7

AVERAGE CHANGES IN LEVELS OF
MUSIC ACHIEVEMENT

1971-72 to 1978-79

Objectives	9-year-olds	13-year-olds	17-year-olds
Value music	**	6.3%*	-2.3%
Identify elements and expressive controls	-3.4%*	-1.7%	-4.8%*
Classify music historically and culturally	-1.9%	-0.2%	-0.9%
Composite for three objectives	-3.3%*	-0.5%	-2.5%*

* Change is significant at the .05 level
** No data